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**THE HONEY BEES OF INDIA, HYMENOPTERA: APIDAE<sup>1</sup>**

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*(With one text-figure)*

**Key words:** *Apis*, Apoidea, honey bees, key, systematics

A summary is given for the honey bee species (*Apis* Linnaeus) indigenous to India. Four indigenous species are recognized from the region; *Apis cerana*, *A. dorsata*, *A. florea* and *A. andreniformis*. All are commonly found in India except for *A. andreniformis*, which is only known from a few specimens collected in the northeastern boundaries of the country. A dichotomous key is presented to aid the identification of these species and notes given on how to separate them from the introduced western honey bee, *A. mellifera*.

INTRODUCTION

The honey bees (genus *Apis* Linnaeus) are by far the most famous of all insects owing to their production of honey, pollination of crop plants, and advanced eusocial behaviour, which has attracted much attention from biologists. Unfortunately, the systematics of this small and highly visible group is not clearly understood. This is partly owing to the high levels of variation within species and to the recent divergence times between taxa. Surprisingly, few modern monographs have been produced to clarify the taxonomic confusion within this important group of bees. The last monograph for the genus was undertaken by Maa (1953); however, his extreme classification recognized 24 species and subspecies in three genera. It is sometimes difficult when utilizing his keys and classification to reconcile names with the seven species generally recognized today.

Most authors today agree upon at least six species: *Apis mellifera* Linnaeus (1758), *A. cerana* Fabricius (1793), *A. dorsata* Fabricius (1793), *A. florea* Fabricius (1787), *A. andreniformis* Smith (1858), and *A. koschevnikovi* Enderlein (1906: not Buttel-Reepen [1906], see Engel [1999]). The Sulawesi bee, *A. nigrocincta* Smith (1861) is also deserving of specific rank, as has been demonstrated by Hadisoesilo *et al.* (1995) and Hadisoesilo and Otis (1996, 1998). Although this taxon was in the past not considered specifically distinct (Engel 1998) it has since been added to the list of valid honey bee species (Engel 1999). Currently, the giant Himalayan honey bee, *A. laboriosa* Smith (in Moore *et al.* 1871), is considered a subspecies of *A. dorsata* (e.g., Engel 1999), but continued work on this taxon may later reinstate it as a separate species. A similar argument can be made for the Bornean honey bees known as *A. nuluensis* Tingek *et al.* (1996) but they are for now best classified as a subspecies of *A. cerana*.

Most recently, Engel (1999) has listed the species in the genus, both recent and fossil, with

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detailed taxonomic histories for all species and subspecies. He has provided revised diagnoses for the genus and its subgenera, and detailed a phylogenetic hypothesis of their relationships. Table 1 outlines the classification of honey bees as it is presently conceived.

Herein I provide a key to the indigenous species presently known from India. The dichotomous key is primarily designed for the worker bees, since this is the caste most often encountered in the field. However, characters for drones and queens are also included, and these castes can be identified with the key. For detailed taxonomic histories of each species refer to Engel (1999).

KEY TO THE INDIAN TRIBES OF CORBICULATE APINAE

- |                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Jugal lobe of hind wing present (Fig. 1b); metatibial spurs absent; arolia present; outer grooves of mandible absent..... 2</p> <p>— Jugal lobe of hind wing absent; metatibial spurs present; arolia absent or reduced; outer grooves of mandible present (Bumble bees; genus <i>Bombus</i> Latreille)..... Bombini</p> | <p>2. Forewing with reduced distal wing venation, marginal cell frequently open at apex; claws simple; penicillum present in worker; auricle absent; sting reduced (Stingless bees; numerous genera)..... Meliponini</p> <p>— Forewing with complete distal wing venation, marginal cell long and completely bordered by veins (Fig. 1a); claws cleft; penicillum absent in worker; auricle present; sting well developed (Honey bees; genus <i>Apis</i> Linnaeus) ..... Apini</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Genus *Apis* Linnaeus

The genus can be distinguished from other corbiculate members of the Apinae by the following combination of characters (see also diagnosis presented by Engel 1999): compound eyes with long, fine hairs; metatibia lacking penicillum; metatibial spurs absent; claws cleft; arolia present; wing venation strong and complete; marginal cell long, bluntly rounded at apex, not tapering along its length; jugal lobe present; compound eyes of drones meet at top of head. Three extant subgenera are recognized (Engel 1999); the giant honey bees, subgenus

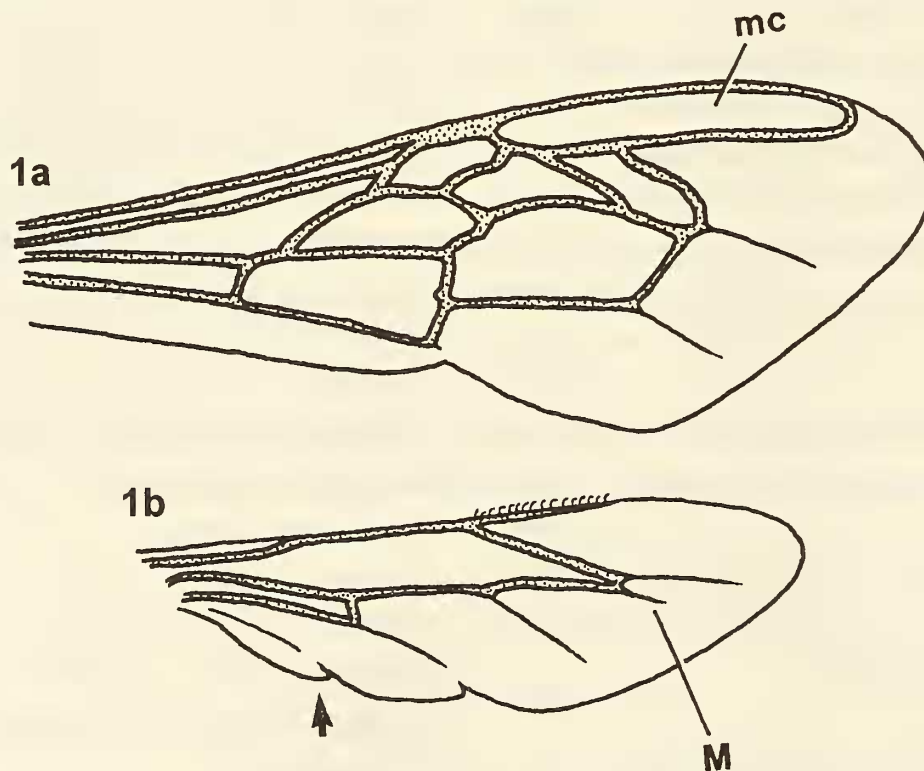


Fig. 1: Diagrammatic wing venation of *Apis* (*Apis*) *cerana* Fabricius

a. Forewing showing the elongate marginal cell (mc) typical of *Apis*, b. Hind wing showing distal abscissa of the Median (M) vein; arrow indicates jugal lobe.

*Megapis*; the dwarf honey bees, subgenus *Micrapis*; and the typical honey bees, subgenus *Apis* s. str. All three subgenera natively occur in India. Both species of the subgenus *Micrapis* are recorded from India while only a single species of *Apis* s. str. is native to the country. The subgenus *Megapis* is monotypic and represented by *A. dorsata*. The indigenous species in India all nest in the open, except for *A. cerana* which nests in cavities.

The western honeybee, *A. mellifera*, has been introduced into India for agricultural purposes. This introduced species is not included

in the key below. It can be separated from the native species before attempting to use the key, by the following combination of characters: distal abscissa of vein M in hind wing absent; size moderate (7-10 mm); wings hyaline; drones without metabasitarsal process.

KEY TO THE NATIVE *APIS* OF INDIA  
(Workers, queens, and drones)

1. Distal abscissa of vein M in hind wing present; worker size variable, moderate to large, forewing length 7-15 mm (subgenera *Apis* and *Megapis*) ..... 2

TABLE I  
HIERARCHICAL CLASSIFICATION  
OF HONEY BEES (ENGEL, 1999)

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GENUS *APIS* LINNAEUS  
Subgenus *Apis* Linnaeus

- A. cerana* Fabricius\*
- A. c. cerana* Fabricius\*
- A. c. heimifeng* Engel
- A. c. indica* Fabricius\*
- A. c. japonica* Radoszkowski
- A. c. javana* Enderlein
- A. c. johni* Skorikov
- A. c. nuluensis* Tingek *et al.*
- A. c. skorikovi* Engel
- A. koschevnikovi* Enderlein
- A. mellifera* Linnaeus
  - A. m. adami* Ruttner
  - A. m. adansonii* Latreille
  - A. m. anatoliaca* Maa
  - A. m. artemisia* Engel
  - A. m. capensis* Eschscholtz
  - A. m. carnica* Pollmann
  - A. m. caucasia* Pollmann
  - A. m. cecropia* Kiesenwetter
  - A. m. cypria* Pollmann
  - A. m. iberiensis* Engel
  - A. m. intermissa* Maa
  - A. m. jemenitica* Ruttner
  - A. m. lamarckii* Cockerell
  - A. m. ligustica* Spinola
  - A. m. litorea* Smith
  - A. m. macedonica* Ruttner
  - A. m. meda* Skorikov

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TABLE I (CONTD.)  
HIERARCHICAL CLASSIFICATION  
OF HONEY BEES (ENGEL, 1999)

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- A. m. mellifera* Linnaeus
- A. m. monticola* Smith
- A. m. remipes* Gerstäcker
- A. m. ruttneri* Sheppard *et al.*
- A. m. sahariensis* Baldensperger
- A. m. scutellata* Lepeletier de Saint Fargeau
- A. m. siciliana* Grassi
- A. m. sossimai* Engel
- A. m. syriaca* Skorikov
- A. m. taurica* Alpatov
- A. m. unicolor* Latreille
- A. nigrocincta* Smith
- subgenus *Cascapis* Engel †
  - A. arnbrusteri* Zeuner †
- subgenus *Megapis* Ashmead
  - A. dorsata* Fabricius\*
    - A. d. binghami* Cockerell
    - A. d. breviligula* (Maa)
    - A. d. dorsata* Fabricius\*
    - A. d. laboriosa* Smith
- subgenus *Micrapis* Ashmead
  - A. andreniformis* Smith\*
  - A. florea* Fabricius\*
- subgenus *Priorapis* Engel †
  - A. vetusta* Engel †
- subgenus *Synapis* Cockerell †
  - A. henshawi* Cockerell †
  - A. longtibia* Zhang †
  - A. miocenica* Hong †
  - A. petrefacta* (Riha) †

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(†) indicates fossil taxa,

(\*) indicates taxa natively occurring in India.

Several of the subspecies presently recognised in *A. mellifera* should probably be synonymized (e.g. *A. mellifera taurica*).

- Distal abscissa of vein M in hind wing absent; worker size small, forewing length 6-7 mm. (subgenus *Micrapis*) ..... 3
- 2. Forewing hyaline; scutellum yellow-brown, rarely black; drone with tarsi unmodified; worker size moderate, forewing length 7-9 mm. (subgenus *Apis* s. str.) ..... *A. cerana*
- Forewing fuscous; scutellum black; drone with dense frond-like setae on meso- and metatarsi; worker size large, forewing length 12-15 mm (subgenus *Megapis*). ..... *A. dorsata*
- 3. Metatibia and dorsolateral margin of metabasitarsus with black setae; metasomal terga 1-2 black, infrequently with reddish-brown hints apically on tergum 1 or basally on tergum 2; drone metabasitarsal process short, less than one-half metabasitarsus length .....  
..... *A. andreniformis*
- Metatibia and dorsolateral margin of metabasitarsus with white setae; metasomal terga 1-2 reddish-brown; drone metabasitarsal process long, more than two-thirds metabasitarsus length ..... *A. florea*

1. *Apis (Apis) cerana* Fabricius, Eastern honey bee: This is the species most often kept in apiaries and used for agricultural purposes as has been done for nearly 5 millenia in India (Joshi *et al.* 1980), although to a lesser degree since the introduction of *A. mellifera*. Feral colonies typically nest in tree hollows, unlike the other three Indian species, which nest openly.

*Apis cerana* is genetically diverse in India with a distinctive western and eastern mitochondrial DNA type (Smith and Hagen 1996). These genetic haplotypes correspond to the "plains bee" and "hills bee" morphs of Ruttner (1988) respectively. The plains bee taxonomically corresponds to the subspecies *A. cerana indica* Fabricius (1798) while the hills bee appears to be *A. cerana cerana*. Eight subspecies of *A. cerana* are recognized, although only two are presently understood to occur in

India (Engel 1999; Table 1).

2. *Apis (Megapis) dorsata* Fabricius, Giant honey bee: This species is commonly referred to as the giant honey bee owing to its large body size. Workers of *A. dorsata* can be quite vicious when the colony is disturbed and their sting is probably the most painful of any honey bee species. Much of the wax and honey harvested in India comes from this species (Thakar and Tonapi 1961, Singh 1980). It builds nests most often high in trees usually affixed to the underside of strong limbs.

Four subspecies are presently recognized in *A. dorsata* (Table 1), but only the nominate subspecies is found in India.

3. *Apis (Micrapis) florea* Fabricius, Red dwarf honey bee: These tiny bees are relatively docile and can be worked with little difficulty; however, some nest disturbances can cause the colony to abscond and rarely are *A. florea* colonies managed by beekeepers. As noted by Otis (1991, 1996), in northeastern India where *A. florea* and *A. andreniformis* overlap, *A. andreniformis* occurs at higher elevations while *A. florea* occurs in the lowlands.

4. *Apis (Micrapis) andreniformis* Smith, Black dwarf honey bee: Unlike its sister species, *A. florea*, which occurs throughout India, *A. andreniformis* is presently restricted to the northeastern regions of the country and is exceedingly uncommon. Otis (1996) gives the distribution for *A. andreniformis* over the entirety of its range and records the few localities from Meghalaya, Sikkim and West Bengal, where it has been captured. The species is probably more common in Bhutan and Nepal, but no collection records have yet been made. *Apis andreniformis* was only recently reinstated as a valid species of the genus by Wu and Kuang (1986, 1987) and further confirmed by Wongsiri *et al.* (1990).

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